active disease nor a single tetanus toxoid injection produces lasting or effective immunity. Cardiac complications may constitute an important cause of death in patients with tetanus.

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Arthrodesis of a Knee for Neuropathic Disease

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TREATMENT of neuropathic conditions in weight-bearing joints has long been a challenge to orthopedic surgeons. In spite of the best possible bracing, slow disintegration with increasing instability and incapacitation may occur. Arthrodesis serves best in these circumstances but has been difficult to attain. In the case here presented arthrodesis was accomplished by using a special clamp which permits the femur and tibia to be tightly pressed together for weeks while bony ankylosis is taking place.

The apparatus consists of two 4 mm. Steinman pins inserted into the femur and tibia, respectively, at right angles to their shafts and compressed by the special apparatus devised by Charnley. The projecting points are held together by screw clamps, and wing nuts are tightened until the Steinman pins bow.

REPORT OF A CASE

The patient, a 54-year-old married agricultural laborer, was first observed August 15, 1958, with pronounced swelling of the right knee, which the patient said "gave way" easily but was not very painful.

Twenty years previously, the patient had had third degree burns over the posterior aspect of both lower extremities, necessitating skin grafts and resulting in some limitation of knee motion. In 1950 a bale of hay was thrown against his right knee. No unusual complications arose then, but after x-ray films had been taken he was told that some day an operation would be needed. About a year previously he had noted gradual swelling of the knee, then rapidly progressive swelling in the preceding two months.

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About 1942 the patient had a positive reaction to a serologic test for syphilis. In 1944 he was treated, apparently with penicillin, once or twice a week for six months. Following this, the patient believed, the reaction was negative for syphilis. He had donated blood on two occasions since then.

Upon physical examination the temperature, pulse and respirations were within normal limits. The blood pressure was 190/110 mm. of mercury in both arms. Some slurring of speech, a suggestion of euphoria and cardiac abnormalities which a consultant considered suggestive of hypertensive vascular disease with probable aortic dilation, were observed. Results of neurological examination were within normal limits except that the pupils were small and did not react to light or accommodation.

The right knee showed massive effusion and considerable instability. Scars over both popliteal areas were well-healed; they caused no limitation of knee motions.

Paracentesis of the knee had been carried out elsewhere several times in the previous few months and the patient was now requesting amputation.

X-ray films of the right knee (Figure 1) confirmed the clinical impression of a neuropathic Charcot joint.

Blood cell count and nonprotein nitrogen content were within normal limits and a serologic test was "weakly reactive" for syphilis. No abnormality was noted in the urine.

Aspiration of the knee was carried out weekly

over the subsequent month, and from 300 to 800 cc. of semi-viscous, yellowish fluid was withdrawn on each occasion.

On September 16, 1958, a compression arthrodesis, using the Charnley method and his compression apparatus, was carried out. At operation the destruction of the joint was seen to be greater than had been suggested on the x-ray films. The menisci and cruciate ligaments were completely destroyed. Upon resection of the articular surfaces, however, the bone appeared fairly healthy, not sclerotic.

After operation the extremity was placed into a Thomas splint and the postoperative course was uneventful. Balanced suspension was continued at home. On October 20, 1958, six weeks after operation, patient was readmitted to the hospital, the pins were removed and the leg was placed into a long leg cast. X-ray films immediately afterward showed the bones in satisfactory position, but films taken the following day showed a half inch separation between the tibia and the femur (Figure 2). Attempts at closed reduction under general anesthesia failed and the knee was reopened on October 24, 1958. There was considerable distraction although some soft callus had formed between the fragments. New Steinman pins were inserted and the Charnley apparatus reapplied. Balanced suspension was used again. Then, on December 14, 1958, a cast was applied, this time without removal of the pins.

Four months after the second operation, the cast and pins were removed and the knee showed solid fusion, clinically and radiologically, and there was no pain. A month later, against medical advice, the patient returned to full-time agricultural labor. He injured his right ankle in stepping into a ditch three or four inches deep. There was great swelling at the joint, but little pain. X-ray films (Figure 3) showed a pathological fracture and extensive Charcot involvement. The fracture was easily reduced and a cast applied. Healing was satisfactory and the patient was able to return to work four months later.

He worked regularly after this, doing agricultural labor, and was handicapped only for jobs requiring squatting or the use of a ladder.

When last observed, May 31, 1961, the patient had no pain in either the knee or the ankle. Fusion of the knee (Figure 2) was solid and the only abnormality noted was slight effusion of the ankle. The right leg was an inch and a half shorter than the left and the patient wore extra lifts in the right shoe to compensate.

Figure 1.—Antero-posterior and lateral x-ray views of right knee, August 1958. Note destruction of tibia (medial aspect) and femoral condyles (posterior).

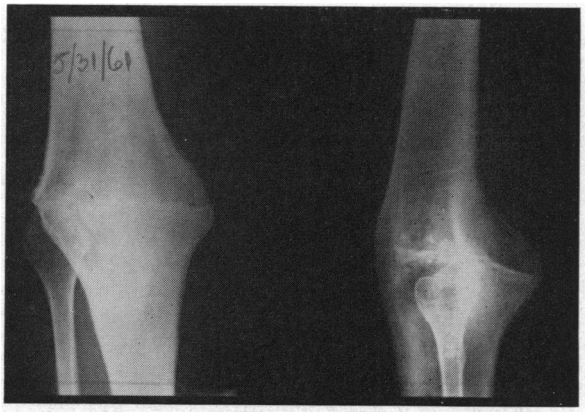

Figure 2.—Antero-posterior and lateral, May 31, 1961, showing solid ankylosis.

DISCUSSION

Results of arthrodesis of "neuropathic knee" have been notoriously poor by all reported methods. Charnley,[2] in reporting 67 knee fusion operations, included only two on neuropathic joints, in one of which the operation failed. Charnley also cited a series in which Bado and Novales,[2] using the compression method, obtained fusion in two of three cases of tabes dorsalis.

Wiseman,[4] reviewing reports of arthrodesis for "neuropathic knee" in 20 cases, noted that the operation failed in three of eleven cases in which the compression method was used. In 1958 Valls[3] reported ten operations for neuropathic disease of the knee, with six successful.

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